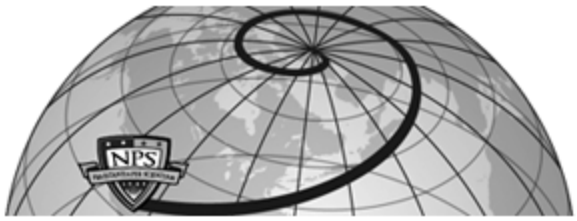

AN APPRAISAL OF ASSET CONTROL TECHNIQUES AS APPLIED IN THE SELECTIVE MANAGEMENT OF HIGH VALUE SECONDARY AERONAUTICAL ITEMS IN THE DEPARTMENT OF THE NAVY

LEONARD E. BROCK

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by

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Lieutenant Commander, United States Navy

Submitted in partial fulfillment of
the requirements for the degree of
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ABSTRACT

Lack of adequate accounting control of high value secondary aeronautical items has been a prime subject of many reports on inventory management in the Military Departments. The importance of special management of high value items has long been recognized. However, until recently, accounting control of high value assets was not given the management attention required in effective overall inventory management systems. As a result, some extremely complex, expensive, and sophisicated inventory management systems have proved less than satisfactory due to a lack of accurate asset knowledge as input. Accounting control for high value assets, as discussed herein, is the means for providing the accurate asset knowledge that is prerequisite to any good inventory management system.

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THE PROBLEM AND DEFINITION OF TERMS USED

> The ever-increasing costs of today's modern weapon systems with concomitant increase in the costs of the major supporting spares and components for these systems have created an impact on the national economy which is approaching that of the military expenditures for World War Two. Defense spending in the aggregate (including nuclear weaponry) is now taking 60% of the entire federal revenue.[1]

All of the Military Departments have realized the foregoing fact of life for some time, and have developed inventory management systems designed to achieve cost reductions through special management of certain high cost supporting spare parts for today's weapon systems. The precise impact of any specific inventory management program in a field as dynamic and complex as the supply support of today's weapon systems is difficult to assess. This is because of the complex mix of factors, tangible and intangible, which affect the operation and efficiency of the sophisticated inventory management programs the Military Departments employ in their ever-growing battle against costs.

1. PROBLEM

Statement of the problem. It is the purpose of this paper to examine several of the inventory management programs which have been developed for management of items designated in various ways as high-value items. In particular the study will examine systems of asset control, if any, employed in these management programs by the Navy, Air Force, and Army. In addition the study will examine the process of development

[1]Charles J. V. Murphy, "The Desperate Drive to Reduce Defense Spending," Fortune, (January, 1964), P. 65.

of an asset control system at the U.S. Navy Aviation Supply Office.

Scope of the study. This study will be limited to the aeronautical segment of inventory. This limitation has been made because the bulk of money value of the Department of Defense secondary item inventory is invested in aeronautical material. Inventory in the Navy Department, for example, can be classified by the remarks of RADM Howard F. Kuehl in an address made at the U.S. Navy Postgraduate School, March 1964, in which he said, "The Aviation Supply Supply Office manages an aeronautical inventory valued at $2.3 billion out of a total Navy Inventory Control Point managed inventory of $3.5 billion." Auditing and review groups are well aware that better than 65% of Navy Inventory Control Point inventory is invested in aeronautical material and have guided their actions accordingly.

Importance of the Study. Special and/or selective management of certain inventory segments has for several years been posed as one of the best ways to reduce dollars invested in inventory. This general recognition of ways and means to reduce investment in inventory has nearly always depended on a centralized data collection point where men and machines converge on the data, as collected, and make judgements based thereon in regard to procurement, repair, redistribution, disposal, etc. The validity of the data collected and used has always been questionable. There has been a general lack of real knowledge of assets in all of the Military Departments. This has been primarily due to failures in the data collection and in the systems for control of assets. Valid asset data is an absolute prerequisite for the success of any inventory management system for high-value material. All too often inventory managers have failed to provide this first and most important ingredient of their

inventory management system. In this study an attempt was made to determine what makes asset control systems work, or fail to work.

2. DEFINITIONS OF TERMS USED

Words and/or terms unique to this study will be defined at the time of their first use in the study. This is neccessitated because of the lack of common usage among the Military Departments. Accordingly, each unique word or term will be used in the manner normally affected by the service concerned.

II

HISTORICAL BACKGROUND

Past reviews of aeronautical support have identified numerous inadequacies in the area of management and control of high-value spare parts within the Navy Department. Reviews of the Aviation Supply Office (ASO) have been conducted by almost everyone in government. The reviews made by the General Accounting Office (GAO) have been the most numerous, and have probably received the most publicity. These reviews can be classed as representative, although generally much more detailed, of all reviews of management of aeronautical support agencies in the Military Departments.

A predominate criticism through-out nearly all reviews has been the failure to account for material, in other words lack of control. For example, GAO specifically cites 745 AN/APN-22/117 radar sets valued at $1,534,700 as being unaccounted for in a 1960 review of Navy electronics items.[2] In a 1961 review of the aviation segment of the Navy Supply System GAO says in part,

> Our review of the supply management of naval aviation parts and assemblies disclosed significant weaknesses which adversely affect the economy and efficiency of these supply operations. As a result of the weaknesses the Navy was buying millions of dollars worth of aviation assemblies and parts and incurring other costs that would not have been necessary if more effective supply management practices had been followed. ---We found that the Navy could not account for aviation assemblies and equipment valued at $48 million which should have been a part of its stock on hand. We further found that the Navy had made recent purchases

[2]United States General Accounting Office, Defense Accounting and Auditing Division, Report on Review of Supply Management of Electronic Supplies and Equipment Within the Department of Defense (Washington: 1960), p. 24.

of some of these items, totaling nearly $12 million, in quantities that were equal to or exceeded the quantities of these items that were not accounted for by the Navy. We have concluded from our review that the Navy cannot currently account for several hundred million dollars worth of the items it has purchased and that a substantial amount of unnecessary buying has occured which would not have been necessary if these stocks had been located. We are recommending centralized control over such items. ---Our review disclosed that actual or planned overbuying had resulted from use of invalid information in predicting needs. We found overstatements of quantities owed to using units aggregating $23 million which supply departments at naval air stations had reported to ASO. Our tests of selected overstatements, totaling $740,000, involving items that the ASO had bought, or was buying, disclosed that actual or planned overbuying aggregating $344,000 had resulted. We also found that ASO's failure to detect errors and oversights in its predictions of needs had resulted in actual or planned overbuying in the amount of $1,070,000. ---We are recommending that improved procedures be adopted for review of predictions of needs.[3]

Again in 1962 GAO reported to Congress that the centralized inventory records maintained by ASO are inadequate for use in determing what quantities of high value "repairable assemblies and equipment" should be purchased.[4] By this time the GAO reviews are beginning to sound repititious. As in 1960 and 1961 GAO cites results of reviews of selected aeronautical secondary items. And again they find that Navy records at ASO do not include quantities of items which should have been carried in Navy assets. This review constituted less than 1 per cent of the "repairable assemblies and equipment" managed by ASO, but represented about 7 percent of the $950 million value of these stocks. On the basis of this sample, GAO took the position that additional "repairable assemblies and

[3]Comptroller General of the United States, Report to the Congress of the United States on Review of Selected Activities of the Aviation Segment of the Navy Supply System, Washington: 1961, pp. 2-3.

[4]Comptroller General of the United States, Report to the Congress of the United States on Review of the Supply Management of High-Value Repairable Aviation Assemblies and Equipment Within the Department of the Navy, (Washington: 1962) pp. 1-2.

equipment" worth several hundred million dollars which should be in Navy stocks were not shown on its records and that a substantial amount of unnecessary procurement has resulted from lack of control over these items as well as those in the sample.

The Navy position on such reviews, as late as June 1962, was that the findings did point out a need for improved inventory management but that they did not indicate general deficiencies to the extent indicated[5]. As a result the Navy proposed to strengthen its then existing inventory management programs but did not propose to make any basic changes in its inventory management methods to deal with the problems disclosed by GAO reviews.

> We do not believe that the proposed improvements in the Navy's inventory management programs provide the accounting control necessary to keep account (italics not in the original) of the quantities and locations of its stocks of high-value repairable assemblies and equipment. Therefore, we are recommending that the Department of the Navy undertake centralized monitoring of the accounting for stocks of these items and other related measures to provide more effective control over its stocks of high-value repairable assemblies and equipment.[6]

It is interesting to note that the 1962 review is the first one in which GAO took a strong position for a system of centralized control for selected items. For the first time GAO formally recommended that for high-value items, because of their significant position in the total inventory, the Navy should employ special controls; controls that could not be economically applied to low-value items.

Up to this point the GAO in the 1962 report, had only advocated that

[5] Ibid., p. 2.

[6] Ibid., p. 2.

the ASO intensify controls over stocks of high-value "assemblies and equipments" through a centralized monitoring system. In the same report, however, GAO recommended that the Selected Item Reporting (SIR)[7] system, instituted by the Bureau of Naval Weapons and managed by ASO be improved and refined to provide more accurate information on critical and expensive items that are difficult to control, such as items that are easily removable from aircraft and equipment that is optional and not necessarily installed on all the applicable aircraft. The SIR system is a completely decentralized system offering no closed accounting for of assets whatever. Recommendations such as these made the 1962 report difficult to reconcile with current and proposed programs of the aviation supply segment of the Navy.

As a result of these and other criticisms the Congress imposed severe budgetory cuts in the fiscal year 1963 funds required for spare parts in the aeronautical segment of the Navy supply system. It can be said that this action caused the Office of Naval Material to commence a study of high-value item management at the Aviation Supply Office;[8] the Office of the Navy Comptroller to direct an "Audit of Selected Phases of the Repairable Items Program of the Naval Aviation Supply System;[9] and the Commanding Officer of the Aviation Supply Office to direct a study of high-value material management policies and procedures.[10] This was the

[7]Department of the Navy, Bureau of Naval Weapons Instruction 4440.1A; Selected Item Reporting (SIR). (Washington: 29 September 1961).

[8]Department of the Navy, Office of Naval Material Letter of 30 August 1962: High Value Item Management Review of the Aviation Supply Office.

[9]Department of the Navy, Aviation Supply Office: Report of the Non-RFI Material Study Group, (December, 1962), p. 1.

[10]Department of the Navy, Commanding Officer, Aviation Supply Office Memorandum of 13 August 1962: Precept for Study of High-Value Material Management Policies and Procedures.

first time such severe budgetary cuts had been imposed by Congress based on GAO reports of inadequate control of high-value assets.

The ASO study is the most significant of the above Navy actions. It was a two stage study designed to (a) develop an immediate program to improve and/or correct the deficiencies in the then existing high-value management programs, and (b) to begin development of an asset control system which would in fact provide the accountability and control of high-value assets so much desired by the Navy as well as outside auditing and reviewing agencies.

The first stage of the ASO study is of little interest in this appraisal in that it merely substantiated findings of previous studies and recommended clean-up of existing data available to ASO commodity managers (managers of a grouping or range of items possessing similar applications and/or characteristics, or which are susceptible to similar management methods), and intensive instruction to commodity managers in the proper use of the relatively inadequate and/or extremely complex data available from the then existing inventory reporting systems. The development of an asset control system in the second stage of the ASO study will be examined in detail later in this appraisal.

There has long been a widely held belief, in some parts of the Navy, that the degree of asset control desired by GAO, and of late the Department of Defense, can not be obtained without resultant costs exceeding the value of the asset knowledge gained. The SIR system, superimposed over existing inventory reporting systems and requiring a myriad of special reports, was cited as an example of this.[11] The costs of obtaining

[11]The Department of the Navy, Bureau of Naval Weapons Instruction 4440.1; Selected Item Reporting (SIR). Washington: circa April 1960.

better asset knowledge must be considered in relation to its worth in budget, procurement, distribution and disposal determinations and decisions. Any savings which might result from a more complete knowledge and utilization of assets must exceed the costs of the control system employed to obtain such knowledge and utilization. A concern for system costs is evidenced throughtout the ASO development of a control system for high-value assets. It was realized that Navy accounting techniques did not permit specific measurements for such costs and savings; however, cost data as was available, coupled with intuitive estimates, statistical projections, etc. were to be used by the system designers.

The Office of Naval Material review of high-value management, in addition to providing assistance and information to ASO, resulted in the publication of a High Value Item Management Policy Manual for the Navy.[12] This manual is directed to the entire spectrum of inventory management of high-value items. As such, it includes policy for control of high-value assets. Specifics of this policy will be examined in detail later.

Any inquiry into the control of high-value secondary items in the Navy, should, of course, refer to the practices and policies of the Army and Air Force in this regard. Accordingly, a somewhat cursory examination of high-value item management in these services, with particular emphasis on control of such items, will be included in the appraisal.

The intricate, complex and expensive weapons of today, more than ever, require effective support. Because of the expense involved it is only by judicious husbanding of our resources that we can expect to maximize our

[12]Department of the Navy, Secretary of the Navy Instruction P4449.2A, High Value Item Management Policy Manual, (Washington: 18 June 1963).

support within the funds available. This means there must be an effective, economical accounting control system for those assets, wherein we have invested the bulk of our funds. Control of assets provides knowledge; the knowledge of asset position and condition which is prerequisite to effective support. Some of the ramifications of obtaining this control will be explored in the remainder of this paper.

III

HIGH VALUE ITEM MANAGEMENT POLICY

The HI-PRI program, established in 1958 by the Aviation Supply Office, is probably the first specialized management program for high-value items in the aeronautical segment of the Navy Supply System.[13] At least seven ASO, and ASO Field, instructions were issued in rapid succession in the implementation of this program. Because of this myriad of instructions further individual references to them will not be made. These instructions cover all aspects of inventory management from procurement to disposal, including physical inventory policy.

The initial selection of HI-PRI items was made from that group of items carried under fraction code "H" (material under this code is subject to scheduled repair or rework by designated industrial air stations). HI-PRI items were removed from "H" fraction and designated as "Q" fraction to indicate that the item was subject to special management under the HI-PRI program. Criteria for initial item selection for HI-PRI was based on individual item stock position, application, and value of any anticipated requirements. Under this selection criteria, an expensive left hand aileron assembly for a given aircraft could be "Q" fraction; whereas, the equally expensive right hand aileron assembly for the same aircraft would be "H" fraction merely because its stock position at the time of selection was better than that of the left hand aileron assembly, therefore, the value of its anticipated requirements fell below the cut off point for "Q" fraction. This inconsistency was carried even further in cases of split

[13]Department of the Navy, Aviation Supply Office Instruction 4408.1; HI-PRI Plan, (Philadelphia, 11 July 1958).

effectivety and interchangeability. A fixation on stock number management versus physical item management could have been the underlying cause for this item selection policy. Tunnel vision could have an an effect also in that consideration was given only to the in-house ICP effects of the policy, disregarding the effect on the field. Why should the left hand aileron be stored separately from the right hand aileron? Separate handling and storage is a requirement of the HI-PRI program. Segregated stock records make this selection policy seem even more suspect.

The HI-PRI plan greatly extended the stock status reporting base for the items concerned. It in effect required some sort of stock status report from every Naval activity, including ships and the Fleet Marine Force, holding "Q" fraction items in store for issue to consumers. These reports were graduated in frequency and depth. Continental stock status reporting (SSR) activities, primarily Class "A" and "B" air stations, and the two tidewater Naval Supply Centers originally submitted daily active item stock status reports on "Q" fraction items, via the most rapid data transmission available to them at the time. Continental (SSR) activities and extra-continental (SSR) activities not on a rapid data transmission network originally submitted weekly active item stock status reports. These activities now submit transaction reports. The remaining shore activities report only the on-hand element of stock status (for all conditions of material held) for "Q" fraction on a monthly basis. Ships and Fleet Marine Force units report inventory on hand (all conditions) on a quarterly basis. Reports from the SSR activities are consolidated and requirements computations are made based on the consolidated reports. The monthly and quarterly reports from the non-SSR activities, ships and Fleet Marine Force units are consolidated, listed and made available to

commodity managers. No firm or written guidelines as to what the commodity manager is to use these reports for has been found.

There are many other facets to the HI-PRI plan such as special labels, expedited handling, special requisitioning channels, quarterly physical inventory, etc. For our purposes in examing control, item selection and reporting are most significant. What really makes an item fall into a high-value category, and how can more timely, accurate and extensive reports gain the desired control of high-value items? The HI-PRI plan, although a progressive step, certainly can not be classed as a control system. It did, and still does, provide more current asset knowledge at any given time, but it does not close the loop of control. HI-PRI does not provide the womb to tomb control of assets required for complete accountability of high-value items.

Selected Item Reporting (SIR) is the first attempt to account for and control the movement of high value items in the Navy.[14] Its purpose was to establish a system of reporting and accounting for selected items of aeronautical material installed in aircraft and/or otherwise in use in place or in store. The original instruction establishing the SIR program was issued jointly in May of 1960 by the Bureau of Naval Weapons and the Bureau of Supplies and Accounts. The instruction we refer to superceded the original instruction as of 29 September 1961 and though issued by BuWeps, and signed by the then acting chief, RADM W.A. Schoech, it was also countersigned by RADM J.W. Crumpacker, Chief, Bureau of Supplies and Accounts. The joint issuance of the original and the joint signing of the superceeding instruction was purportedly to add status to the program.

[14] BuWeps Instruction 4440.1 Op. Cit. pp. 1-4, ends. 1-5

It is difficult to trace the development of this program. It is known that originally the entire program was to be a BuWeps program and to be administered by or through that bureau. Criticisms of BuWeps inventory management of its "V" cognizance material furnished the impetus for a system of control of this material, most of which could be classed as high value. At a point late in the development of the program a decision was made to include "R" cognizance material (aeronautical items under the inventory management of ASO) in the SIR program. Some of the "R" cognizance items would be transferred to "V" cognizance and some would come into the program as "R" cog. Here, as in HI-PRI, there appeared to be little concern for the effect on the field in this changing of the stock numbers (a cognizance change, though not a stock number change per se, requires similar manipulations throughout the supply system as does a change in the basic stock number). In addition to cognizance changes, all stock numbers for the items in the SIR program were to be assigned a special SIR technical supply management code (TSMC) composed of the letters S I R and a fourth character for internal control purposes; the letters S I R were for program identification. In addition to the foregoing there is special handling, storage, marking, etc. required for SIR items.

It is interesting to note that the criteria for selection of the original SIR items was apparently never formalized. Some were items for which the Office of Analysis and Review required material planning studies (DD764's), the majority were not. The initial selection included integral parts of aircraft such as wings. In most cases the items had a high-unit price although some were priced as low as $100.[15]

[15]Navy Stock List of the Aviation Supply Office, Section P2099, July 1960.

As noted previously, the original SIR program was to be managed by BuWeps; however, at an undetermined date just prior to scheduled implementation of the program on 1 July 1960 a decision was made to have ASO assume management of the SIR program. The system as designed was not compatible with ASO systems management but the program was implemented on schedule. For the first two months field activities were required to replenish by pulling (placing requisitions on ASO) stocks of SIR material.[16] This fact alone reveals how unprepared ASO was to accept the job. ASO had for many years operated a push system of resupply for its stock points. The peculiar SIR TSMC could not be handled in the ASO computer system. Accordingly, there was a two month delay in developing systems for handling SIR items.

The requirement to report SIR items installed in aircraft by their applicable stock number turned out to be an almost impossible task. The installed records were maintained by the Fleet Aviation Accounting Offices and designated shore stations by individual stock numbers. The absolute requirement that receipts, turn-ins, surveys, etc. match by stock number was a nightmare for all hands. The wings mentioned earlier had been procured as an insurance item early in the life of the applicable aircraft program and as a routine practice aircraft service changes were not incorporated in spares of this nature until a requirement existed. Because of this none of the installed wings could be related to the stock number of the wings in store. All installed wings had, of course, been changed and modified many times over by aircraft service changes.

[16] Department of the Navy, Aviation Supply Office letter of 12 July 1960: Planning and Control Conference, 14-15 June 1960; summary of

One item, the afterburner assembly used on the J-65 engine when installed in an F-11 F aircraft, had twenty two stock numbers. Depending on maintenance practices, the stock number of this item could change while the aircraft was undergoing a burner check in squadron maintenance merely because of application of a different holding assembly. The gyro in the central air data computer system of the F4H aircraft was a SIR item. This item is buried inside of the main frame of the computer. Operators were not happy about opening up a functioning computer to see what kind of gyro was inside. The above are only a few of the problems encountered in operation of the SIR system.

As a result of these and other problems ASO, assisted by BuWeps, developed some system changes in an effort to make the program pay off. Along with the system changes was a formal statement of policy regarding ASO management of the SIR program. In part, BuWeps policy is that ASO is assigned the responsibility and authority for administering the SIR program within the parameters of guidelines contained in the revised instruction and in accordance with any subsequent policies issued by BuWeps. Included as policy was the authority for ASO to issue and/or modify SIR procedures based on operating experience and the authority to police, check and verify reports submitted under the program.[17]

The major system changes made were the adoption of a Master Equipment Number (MEN) for SIR items installed/in use or in place, the removal of the SIR-TSMC with concomittant return of the normally applicable TSMC for the item concerned, and the adoption of the fraction code "G" to denote SIR in the same manner that the fraction code "Q" denotes HI-PRI.

[17] BuWeps Instruction 4440.1A, op. cit., enclosure 1, p.2.

The net effect of the above changes was to establish reporting requirements based on three categories of material -- installed/in use, in place or in store. These categories of material and the method of reporting can be described as follows:[18]

Reporting Category and Method	Material
Installed/in use -- By Master Equipment Number (MEN) (No condition code) to the appropriate Fleet Aviation Accounting Office (FAAO) or designated stock status reporting activity.	Material installed in aircraft or otherwise in use by an activity operating aircraft (organizational property).
In Place -- By Master Equipment Number (MEN) (Preceded by an appropriate condition code) to the appropriate FAAO or designated stock status reporting activity	Material in place in ships, Air FMF units, prepositioned in the hands of users, in rotatable pools (O&R's, AMD's etc.) bench sets, training devices and the like held on custody for accountable officers. This also includes material in packups, fly-away kits, etc. not otherwise reported by an accountable officer in stores account 52000; government furnished material (GFM) held by contractors for installation in end articles not yet accepted by the Navy; and material held by contractors for commercial overhaul, rework, modification, etc.
In Store-- By Federal Stock Number (With appropriate condition code) to the Aviation Supply Office in accordance with normal stock status reporting procedures or to a designated stock status reporting activity for transmittal to the Aviation Supply Office.	Material "in store" in store account 52000 in the custody of an accountable officer. SIR material may not be carried in "three digit" accounts.

The change from the SIR-TSMC to a regular system TSMC and the

[18] BuWeps Instruction 4440.1A. op. cit; enclosure 1, pp. 2-3

adoption of the "G" fraction code was done primarily to permit assimilation of SIR items into the Navy aviation supply system ADP management techniques. The new format, or rather return to the regular format, of the SIR stock number now permitted requirements computations, industrial forecasts, etc., to be made on SIR items using proven computer systems techniques. It also facilitated field management, particularly in the large mechanized activities. The aviation supply system, and particularly the Bureau of Naval Weapons, should have learned much from this abortive attempt to alter an existing stock numbering system rather than to adopt the system to the purpose at hand. It is impractical to attempt to cost a stock number change, but everyone in management should realize that a single stock number change of any kind, beginning with the fraction code through the technical supply management code, can trigger hunreds, perhaps thousands, of individual actions through-out the system. In the case of SIR, at least the first set of stock number changes could have been avoided.

The utilization of a Master Equipment Number is merely a recognition of the facts of life, namely that federal stock numbers are non-significant and have no meaning whatever to operators. The Master Equipment Number is a significant method of identifying equipment. For the most part Master Equipment Numbers are numbers normally found on name plates, in technical publications, etc. They are generally composed of such as installation letters, type of equipment numerical indicators, purpose letters, model numbers, modification sequence, components, set, or unit indicators, etc. Typical Master Equipment Numbers and their composition are:[19]

[19] BuWeps Instruction 4440.1A op. cit.; enclosure 1, pp. 2-3

A	T	P	J	3	(Six Federal
Airborne Equipment	Tank	Pylon Mounted	North American Aircraft Company	Model Number	Stock Numbers are assigned to this item.)

RT	220	ARN	21	
Receiver/ Transmitter	Model Number	Airborne Radar Navigation Equipment of which the RT220 is a component	Model Number	(Eight Federal Stock Numbers are assigned to this item.)

The use of the above numbering system permitted the grouping together of SIR items which were interchangeable as to form, fit and/or function under one Master Equipment Number. The operator is now concerned with only 128 significant Master Equipment Numbers (most of them already familiar to, and used daily by him) instead of 373 Federal Stock Numbers.[20]

The SIR system has remained basically unchanged since incorporation of the above changes. As a result of the changes it is a system that can be lived with, though not necessarily liked. The degree of validity and reliability of asset data is still below that required in the management of this type of material. ASO, the inventory manager, still has difficulty in accounting for the total assets of the material concerned. This seems to be primarily due to leakage in the reporting system. Material has a tendency to get lost when moving between fleet activities, shore activities, contractors, etc. Losses also occur in repair/rework cycles in Overhaul and Repair activities and in Aircraft Maintenance Departments. In view of this the value and accuracy of the asset data is questionable in view of the cost of administering the system. In other words "the means ought to be proportioned to the ends."[21]

[20]Navy Stock List of the Aviation Supply Office, Section P2099, June 63

[21]Alexander Hamilton. The Federalists.

The magnitude of the management resources applied in the Air Force HI-VALU program is impressive. Lack of utilization of ADP in program management is significant, particularly when there is no dearth of ADP equipment in the Air Force. Admittedly management of high-value items requires a much higher degree of human judgement than other inventory categories; however, the validity of human judgements can be increased if the knowledge of assets can be made more current and correct through automation.

Before reviewing the Air Force HI-VALU program and its effectiveness in achieving the degree of asset knowledge desired by GAO and DOD, it is appropriate to reiterate the definition of accounting control as used in this study. For purposes of this study control implies knowledge of total asset position in order that budget, procurement, distribution, and disposal determinations and decisions can be made as accurately as possible. This is not the sense in which the Air Force uses the term. This can best be explained by the fact that the Air Force suffered just as severe budget cuts, proportionally, as did the Navy in Fiscal Year 1963 due to their inability to "account" for material. In the words of GAO this system also lacks "accounting controls necessary to keep account of the quantities and locations of its stocks of high-value repairable assemblies and equipment."

As mentioned previously there is no doubt that the Air Force has made an early and tremendous effort in the field of high-value management. Probably most significant here is the fact that the Air Force HI-VALU program is a total program, a command program permeating all echelons of management including operators. For instance, Command HI-VALU Program Control Officers report directly to the activity Commander vice the

Supply Officer, Maintenance Officer, etc.[22] A typical Air Force base HI-VALU organization is composed of the following personnel:[23]

a. HI-VALU Program Control Officer

b. HI-VALU Requirements Control Officer

c. HI-VALU Maintenance Control Officer

d. HI-VALU Procurement and Production Control Officer

e. HI-VALU Comptroller Control Officer

f. HI-VALU Assistant for Programming Control Officer

g. HI-VALU Quality Control Officer

The magnitude of the Air Force HI-VALU effort can best be typified by the amount of effort applied in Air Force Project MINT. This project is the Air Force extension of the DOD Project SHAKEDOWN, a standardization of Federal Stock Numbers in federal class and group 2815 as applied to like items in the Navy and Air Force. Under SHAKEDOWN, item characteristics are developed which permit a federal type 1a item description for cataloging purposes. It can be said that a good type 1a description permits everyone to identify like items to the same federal stock number. Managers of some technical inventories have commonly used type 2 descriptions which reflect only such things as specification/drawing numbers, manufactures part numbers, etc. with no attempt to describe the item in a standard manner as in type 1a. The reduction of stock numbers under SHAKEDOWN has been outstanding. In view of this, the Air

[22] Department of the Air Force, Air Force Spares Study Group; Improving HI-VALU Operations at A F Bases, (Hq. Air Material Command Wright-Patterson AFB, Ohio; June 1957) p. 7.

[23] Department of the Air Force, Air Force Spares Study Group; Check Up On Your HI-VALU Operations. (Hq. Air Materiel Command Wright-Patterson AFB, Ohio; June 1957) p. 7.

Force extended this type of review, under the name of MINT, to all Air Force items and budgeted 1500 man years to the first year's work.[24] This gives evidence to the depth of resources available in the Air Force to carry out a given effort. On the basis of MINT, it is reasonable to assume that the resources applied to HI-VALU have been significantly larger.

The selection of items for HI-VALU is very formalized and deliberate. Each HI-VALU item is so designated by a formal board known as the HI-VALU Review Board for a given weapon system. Review boards consider each item based on a combination of unit cost, total line item procurement under consideration, usage cost, and/or essentiality to the Air Force mission. The HI-VALU Review Board not only selects items for initial inclusion in the HI-VALU program, but continues to maintain surveilance of them through-out the life of the program concerned. This is done through the media of HI-VALU Review Board Meetings at specified intervals, but never less than annually. There were about 8,000 master items in the HI-VALU program in 1963. This means 20,000 stock numbered items at 2.5 to 1 ratio of stock numbers to master items. Navy experience in repairables indicates that an overall ratio of stock numbers to master items of 2.5 to 1 is most conservative. The ratio in electronics items is considered to be higher. As of 1960 approximately $1,353,736,471 or 67% of the money value of Air Force Master Repair Schedules was in HI-VALU items.

Returning to the subject of control, it is of interest to note a development of a procedure to obtain information on HI-VALU assets in

[24]Department of Defense, Defense Supply Agency, Report on the Management of Aeronautical Materiel Within the Department of Defense (Volume 5) (Washington: January, 1964). p. 207.

an intransit status. In the Air Force, as in the Navy, items were dropped from stock records when shipped and were lost to the system until picked up on stock records at the point of receipt. This meant that some assets did not appear on any records at certain times and were not taken in consideration when computing or reviewing requirements. The Air Force solution was to close this gap. This was done by requiring that the shipping activity retain the quantity on its stock records until an agreed upon date had been reached, at which time the receiving activity would assume accountability and reporting responsibilities.[25] In other words this procedure purports to eliminate material float between activities. The administration of this could be a problem if the material concerned failed to get to the right place at the right time. However, so long as the Air Force continues their present asset and consumption reporting system, called the Stock Balance and Consumption Report, this system appears to have some merit.

The literature available indicates that the Air Force has not been able to overcome the problem of un-accountable losses of assets even though the HI-VALU program has been in effect for many years.[26] Their problems, as one might suspect, are in the accounting, inventory and reporting phases of their HI-VALU inventory control program. At the present time the Air Force Stock Balance and Consumption Report is submitted semi-annually with cut off dates of 15 April and 15 October of each year, with a planned future frequency of monthly or quarterly.[27]

[25]Dale L. Walther, An Evaluation of the Air Force HI-VALU Program, (Industrial College of the Armed Forces, Washington: 1959). p. 16

[26]DSA, Report on the Management of Aeronautical Material Vol. V op. cit. p. 13

[27]DSA, Report on the Management of Aeronautical Material Vol. V op. cit. p. 275

In addition to the semi-annual Stock Balance and Consumption Reports, asset balances only are reported as of 15 January and 15 July. HI-VALU item reports must be submitted to arrive at the respective Inventory Manager within 24 days after the "as of" date. Of the 516 reports made on the October 1962 reporting cycle 191 were late. Stock Balance and Consumption Reports are considered only 50% accurate by Headquarters, Air Force Logistics Command.[28] This is difficult to measure, but it is based primarily on auditors reports and from comparing one Stock Balance and Consumption Report with another. The consolidated Stock Balance and Consumption Reports are not available until some ten weeks after the report cut-off date.[29] Aside from the obvious error problem the timeliness of these reports is hardly appropriate for HI-VALU management. Because of the inadequacies of the Stock Balance and Consumption Report the Air Force inventory managers are expected to use derived assets in the application of assets to gross requirements computations.[30] These assets are developed by inventory managers as the difference between total system assets at the start of the period less reported issues, with the results being the assets which should be in the system as of the end of the reporting period. The difference, if any, between total assets reported on the Stock Balance and Consumption Report and those developed by the inventory manager are identified as derived assets and also are

[28]DSA, Report on the Management of Aeronautical Material Vol. V. op. cit. p. 299.

[29]DSA, Report on the Management of Aeronautical Material Vol. V. loc. cit.

[30]DSA, Report on the Management of Aeronautical Material Vol. V. op. cit. p. 258.

included in netting out the gross requirement. In other words they do just about what an inventory manager at the Aviation Supply Office does when he computes a procurement.

Increased training and increased staffing has been the Air Force approach to solution of the above problems. It would appear that they have a system design problem, as does the Navy. Without a workable system of asset accountability and movement control neither service can expect to gain the degree of asset knowledge required for effective management of HI-VALU items.

The Army has a program in being for the management of what they call Super High Dollar Value items. These are items selected by the Army Material Command for world-wide asset reporting and comprehensive supply control studies based on the importance of the item, a significant investment in inventory, and/or high unit price.[31] As late as September 1963 seventy four items were designated Super High Dollar Value and plans were being made to merge the monthly asset reporting system for these items with the daily system in use for engines.[32] It could not be determined from the literature available as to whether the new system would be on a transaction reporting basis or on an active items basis, nor whether reports would be generated below what the Army refers to as major overseas depot level.

[31] DSA, Report on the Management of Aeronautical Material Vol. 3. op. cit. p. 23.

[32] Department of the Army, Supply Maintenance Command, Aviation Material Maintenance Improvement Program Progress Report Quarter Ending 30 September 1963. p. C-1.

The fact that the Army includes assets at all levels down to and including the user level when computing requirements does not necessarily indicate a real knowledge of those assets. This may explain Army testing of a new initial inventory model encompassing those elements necessary to properly reflect world-wide assets and to meet requirements of DOD as well as GAO.[33]

The Army position is that their distribution system, based on centralized requisitioning, provides adequate asset information for use in requirements computation, therefore, there is no need for a special asset and consumption reporting system. Apparently this position could not hold-up in the face of the pressure by the Department of Defense through the Aviation Material Management Improvement Program. The Army net depot method of requirements computation is based on the assumption that all pipelines below depot level are full, therefore issue from the depot represent true replenishable demand for using units within the Army.[34] This method, in reality, considers only depot assets and issues.

The magnitude of the Army problem should rapidly increase as their air arm continues to grow in size and complexity of aircraft. Fortunately they may have time to develop a workable asset control system while the numbers of items to control are still small. Experience on a small scale should enable the Army to easily expand to a larger scale system without encountering the problems that the Navy and Air Force have encountered.

[33] Ibid. p. C-7.

[34] Ibid. p. C-8.

IV

DEVELOPMENT OF A HIGH VALUE ASSET CONTROL PROGRAM BY THE AVIATION SUPPLY OFFICE

In 1962 the Aviation Supply Office undertook the development of a system designed to provide accurate, timely, and complete knowledge and control of designated high-value items held in stores accounts and suspense accounts by 149 activities afloat and ashore, held in place in 700 activities through-out the world, and held by some 300 activities in special situations and installed in Naval aircraft. In so far as practical, development of this system will be traced from its inception through completion of its prototype with subsequent recommendations.

The ground rules for development of such an asset control system were enumerated in Chapter 1, but it should be mentioned again that the design of the system was heavily influenced by admonitions in regard to system cost vs system effectiveness. Another influence was the knowledge that any system developed must be prototyped and proven before implementation. This approach was somewhat different from the usual "shoot first and ask questions later" method of system implementation. The Department of Defense Project 65, which evolved into the Department of Defense Aeronautical Material Management Improvement Program, also greatly influenced the system design.[35]

At issue through-out the development of the High Value Asset Control System was the matter of just what items would come under such a control system should it be implemented. Although the Aviation Supply Office

[35]Department of Defense, Assistant Secretary of Defense for Installations and Logistics, "Aviation Material Management Improvement Program", (Washington, D.C.; 17 August 1962)

had definite views in this regard it was realized that the system under development could well be a forerunner of a Navy wide asset control plan, therefore, the Bureau of Supplies and Accounts as well as the Office of Navy Material, were concerned in defining the items to come under high-value management. Both of the latter, favored a velocity/value approach to selection. As a result the Navy will select items for special high value management:

"(1) When during periodic review or at time of provisioning, system stocks are to be procured and in addition:

(a) The forecast annual replenishable demand is equal to or greater than $40,000; or the total requirement for any future 12-month period, including outfittings and other program requirements, is predicted to be equal to or greater than $100,000; and

(b) The procurement of new stocks is forecast in either the apportionment or budget year, if managed routinely; or expedited repair of recoverable material is necessary in lieu of procurement.

(2) When it is planned to procure more than $100,000 worth of the item in either the budget or apportionment year to meet end use requirements, and no system stocks are to be procured. --- An item qualifying under paragraph (1) above will be deleted from High Value Management when it is expected that it will fail to meet the criteria for at least two years. --- The criteria stated in paragraphs (1) and (2) above are not considered to be optimum criteria. - - - Inventory managers may request changes in the criteria to provide additional item coverage.---."[36]

[36] Sec. Nav. High Value Item Management Policy. op. cit. p. 2.

The above criteria seems valid for overall inventory management purposes. Extrapolation of Table # 1 would indicate that the $40,000 replenishable figure will cover more than eighty per cent of the dollar value (or items) of replenishable demand for repairables under ASO management. Direct comparison with the Navy's estimate that one per cent of the items in inventory will account for forty per cent of the annual dollar investment is not possible due to the fact that replenishable demand in repairable spare parts does not necessarily indicate a buy requirement. However, experience does indicate that the estimate is valid.

Navy policy for high-value item management also calls for activities designated as stock status reporting activities by cognizant inventory managers to report changes in condition or location of high-value items on a transaction basis.[37] Depending on the mode of data transmission, Navy inventory managers will receive such transaction reports on a daily basis as a minimum. Some of the larger activities may make transaction reports several times a day. It is interesting to note the difference between this reporting policy and that of the Air Force. Assuming the same error rate for both, the Navy with its current asset data, should be in a much better management position than the Air Force with its old asset data.

While all of the above is interesting it did not directly affect the design of the High Value Asset Control system at the Aviation Supply Office. However, it should be realized that item selection means a lot when trying to sell a program such as this to the field. The High Value

[37]Sec. Nav. High Value Item Management Policy. op. cit. p. 1.

Material Management Policies and Procedures Study Group (refered to hereafter as the High Value Study Group) found that faulty initial item selection had a profound and detrimental effect in field supply activities and with operators.[38] Shortly after implementation of the SIR program a review was made of the items initially selected and almost fifty per cent of them were deleted and replaced by new items.[39] The Hi-Pri system started life with large material excesses contrary to stated management policy.[40] As noted earlier there has always been considerable movement of items into and out of high-value management programs. In some cases such movement can probably be justified, but decisions in this area should only be made at a very high management level after due consideration of all facts. Experience would indicate that it is best to start small and grow cautiously in systems such as these.

The High Value Study Group was primarily concerned with just what items should be totally controlled and accounted for through-out all echelons of the Navy. In studying this problem they analyzed such things as replenishable demand/velocity value, inventory investment, military essentiality, etc. (see Table #1 for an analysis of velocity value). Only the Master Control File (Repairables) was studied. This file accounted for approximately $1.3 billion of the total aeronautical inventory investmentof $2.3 billion in 1962. In view of this, the limiting

[38]Department of the Navy, Aviation Supply Office, High-Value Material Management Policies and Procedures Study, Phase 1 Report, (Philadelphia: 4 September 1962) p. 2.

[39]ASO, High Value Material Management Study, Phase 1 Report loc. cit.

[40]ASO High Value Material Management, Phase 1 Report loc. cit.

of their analyses to this inventory appears most valid. Tables #2 and #3 are summaries of some of the machine listings and calculations made in the course of the study. Few inventory management sophisticates are surprised that a relatively small percentage of items account for the majority of sales. This relationship is invariably found in any inventory and the ratio value increases as the technical complexity of the items increases. It is the relationship of unit price to inventory investment, replenishable demand/velocity value, and military essentiality that some people find difficult to believe. The Aviation Supply Office studies (see Tables #2 and #3) proved conclusively that high unit price is closely correlated with high inventory investment and high replenishable demand/velocity value as well as high military essentiality. This relation is most significant for asset control purposes. Since total asset control must go to the lowest echelon there is a need for a standard that anyone can understand. The standard in this case is high unit price. Everyone understands the meaning of money when related to a specific item at hand. The mere fact that an item is expensive is reason enough for special care. Whether the item has a velocity value of $40,000 or $4,000,000 is of little interest to the average sailor or GS-4 stock clerk. This high unit price approach to item selection for accounting control of assets has been accepted and is now Navy Department policy.[41] It is significant to us that this appears to be the first official recognition that accounting for certain assets can be accomplised as an independent part of an overall special inventory management program. The asset accounting or control system merely ensures the validity of input into the management system.

[41]Sec Nav, High Value Item Management Policy. op. cit. p. 3-1.

Aviation Supply Office Master Control File (With Inventory, 1961)
Replenishable Demand of Repairables; G, Q & H Fractions

Replenishable Demand	Number and Per Cent of Master Items (Cumulative)		Replenishable Demand in $'s (Cumulative)	Per Cent of Demand (Cumulative)
Over $5 M	5	0.3%	$61,489,530	13.2%
$4 - 5M	10	0.6%	$83,658,308	18.0%
$3 - 4M	16	0.9%	$102,958,878	22.2%
$2 - 3M	26	1.5%	$127,721,531	27.7%
$1 - 2M	61	3.5%	$164,497,910	35.4%
$0.5 - 1M	172	9.8%	$239,870,000	51.8%
$0.4 - 0.5M	228	13.0%	$264,873,417	57.3%
$0.3 - 0.4M	319	17.0%	$296,551,446	64.0%
$0.2 - 0.3M	478	27.0%	$335,171,203	72.3%
$0.1 - 0.2M	1,001	56.6%	$409,552,396	88.5%
$0.05 - 0.1M	1,777	100%	$463,843,449	100%

TABLE 1

AVIATION SUPPLY OFFICE MASTER CONTROL FILE (WITH INVENTORY) 2nd QUARTER 1962

Velocity Value/Inventory Value of Repairables; G, Q & H Fractions

Unit Price $'s	Number of Stock Numbers	%	Cumulative %	Velocity Value (VV) $'s	%	Cumulative %	Inventory Value (IV) $'s	%	%	IV/VV
0 - 5	1,552	6.5	6.5	9,867	0.0	0.0	32,089	0.0	0.0	3.2
6 - 10	92	0.3	6.8	22,318	0.0	0.0	152,848	0.0	0.0	6.8
11 - 50	1,576	6.6	13.4	3,085,307	0.5	0.5	21,410,347	1.6	1.6	6.9
51 - 100	2,106	8.9	22.3	7,957,886	1.3	1.8	30,046,093	2.3	3.9	3.8
101 - 500	8,533	35.9	58.2	71,546,886	11.9	13.7	232,278,553	18.3	22.2	3.2
501 - 1000	3,642	15.3	73.5	68,149,795	11.3	25.0	172,712,226	13.6	35.8	2.5
1001 & Over	6,330	26.5	100%	452,718,667	75.0	100%	813,379,731	64.2	100%	1.8
Totals	23,831	100%		$603,490,726	100%		$1,270,011,887	100%		

TABLE 2

The timing of the decision to develop a High Value Asset Control system was most fortuitous. Transaction reporting from stock status reporting activities to ASO using NAVSTRIP (NAVSANDA Publication 408) as a base, had been developed for "G" and "Q" fraction material, and ASO had received an IBM 1405 Random Access Storage Unit for test use with one of the IBM 1401 computers then on board.[42] NAVSTRIP provided the needed standard vehicle for control, and random access equipment was capable of reacting to the requirements of an accounting control system.

The next action was actual development of a prototype High Value Asset Control system designed to take advantage of the improved facilities for nechanized accumulation and processing of system exchange data. The real challenge was to establish an unbroken chain of accounting control, complete with audit trail, through existing Navy and Marine Corps logistic support channels. The lack of audit trail and the requirement for special reports outside of normal logistic actions were major weaknesses in the SIR program.[43] The High Value Asset Control system was designed to provide accounting control of each segment of inventory, even though the material handling and control functions required between the point of removal of an unserviceable item and its ultimate return to serviceable condition, disposal, replacement from purchase, etc. are fragmented into many echelons of the logistics system. Table #3 is in-

[42]Department of the Navy Aviation Supply Office, Test Program for Application of Transaction Reporting and Random Access Data Processing Equipment to the Management of High Value Material, (23 March 1962). p. 1.

[43]ASO High Value Material Management Study, Phase 1 Report. op. cit. p. 3.

SAMPLE HI VAC TRANSACTIONS

		DEC. IDENT.	RI TO	M & S	STOCK OR PART NUMBER: FSC	FIIN	TSMC	UNIT OF ISSUE	QUANTITY	DOCUMENT NUMBER: SERV.	REQUISITIONERS ACCTG NR	JULIAN DATE	SERIAL NUMBER	SUFFIX or DEMAND	SUPPLEMENTARY ADDRESS: SERV.	ADDRESS	SIGNAL CODE	FUND CODE	COGNIZANCE SYMBOL	PROJECT CODE	PRIORITY	REQ'D DEL. DATE	ADVICE CODE	R.I. FROM	TRANS. CODE	P.R./RES.	FRACTION CODE	CONDITION CODE	JULIAN DATE OF TRANSACTION
TRANSFER TO OTHER SUPPLY OFFICER ON BASIS OF REQUISITION (8ØA) PASSING ORDER (83A) OR REFERRAL ORDER (84A)	1	B Ø A B 3 A B 4 A	N 3 2							N	6 Ø Ø 8 7	3 1 3 9	Ø Ø Ø 1						2 R					P Q Z	C		Q	Ⓒ	3 1 4 1
TRANSFER TO OTHER SUPPLY OFFICER ON BASIS OF SUPPLY DIRECTIVE	2	B 1 A	N 3 2							S	Ø Ø 1 2 7								2 R					N N Z	C		Q	Ⓒ	3 1 4 2
TRANSFER TO OTHER SUPPLY OFFICER ON BASIS OF REDISTRIBUTION	3	B 2 A	N 3 2							R	6 Ø Ø 8 7								2 R					N N Z	C		Q	Ⓒ	3 1 4 2
RECEIPT FROM THE OTHER SUPPLY OFFICER	4	B J 2 B L 2 B J 6	N 3 2							N	6 Ø Ø 8 7	3 1 3 9	Ø Ø Ø 1						2 R					P 1 2	L J		Q	Ⓒ	3 1 4 7
ISSUE TO SQUADRON, EXCHANGE ITEM REQUIRED (REQUISITION) (USE 9ØØØ SERIES SERIAL NUMBER	5	B Ø A	N 3 2		1 5 6 Ø	2 4 5 3 Ø 6 7	A S K Y			N	Ø 9 3 5 4	3 1 4 Ø	9 1 3 7						2 R					P Q Z	A		Q	Ⓒ	3 1 4 Ø
RECEIPT OF UNSERVICEABLE EXCHANGE ITEM FROM SQD. (PERPETUATE 9ØØØ SERIES SERIAL NUMBER FROM REQUEST/ISSUE DOCUMENT.)	6	B M C	N 3 2		1 5 6 Ø	3 3 9 9 5 5 6	A S K Y			N	Ø 9 3 5 4	3 1 4 Ø	9 1 3 7						2 R					P Q Z	L		Q	B	3 1 4 1
TRANSFER TO DOP (WHEN STATION HAVING MATERIAL IS NOT DOP)	7	B S O	N 3 2							N	Ø Ø 1 2 7	3 1 4 3	Ø Ø Ø 1		N	Ø Ø 1 8 8			2 R					P Q Z	C		Q	B	3 1 4 3
RECEIPT OF UNSERVICEABLE ITEM AT DOP (FROM ANOTHER STATION)	8	B S O	N 3 2							N	Ø Ø 1 2 7	3 1 4 3	Ø Ø Ø 1		N	Ø Ø 1 8 8			2 R					P N Z	L		Q	B	3 1 4 9
INDUCTION INTO O&R REDUCTION OF RB/RE/RO	9	B S 6	N S 2							N	Ø Ø 1 8 8	3 1 5 9	1 Ø 2 3						2 R			4 6 3		P N Z	C		Q	Ⓓ Ⓑ	3 1 5 9
INDUCTION INTO O&R INCREASE OF RZ	10	B S 6	N 3 2							N	Ø Ø 1 8 8	3 1 5 9	1 Ø 2 3						2 R			4 6 3		P N Z	L		Q	Z	3 1 5 9
RETURN FROM O&R (REPAIRED) REDUCTION OF RZ	11	B L 6	N 3 2							N	Ø Ø 1 8 8	3 1 7 5	1 Ø 2 3						2 R			4 6 3		P N Z	C		Q	Z	3 1 7 5
RETURN FROM O&R (REPAIRED) INCREASE OF RFI	12	B L 6	N 3 2							N	Ø Ø 1 8 8	3 1 7 5	1 Ø 2 3						2 R			4 6 3		P N Z	L		Q	Ⓕ	3 1 7 5
SURVEYED CANNIBALIZED OR TRANSFERRED TO B270 DURING O&R CYCLE	13	B L 8	N 3 2							N	Ø Ø 1 8 8	3 1 7 1	1 Ø 2 3						2 R			4 6 3		P N Z	C		Q	Z	3 1 7 1
ISSUE TO IN PLACE	14	B Ø A	N 3 2							N	6 2 2 6 9								2 R					P 3 3 4			Q	Ⓒ	3 1 4 9
ISSUE TO ORGANIZATIONAL AIRCRAFT (USE 9ØØØ SERIES SERIAL NR)	15	B Ø A	N 3 2							N	6 2 2 6 9		9 Ø 9 9						2 R					P 3 3 A			Q	Ⓒ	3 1 4 9
COMMERCIAL OVERHAUL SHIPMENT FROM RB	16	B A 1	N 3 2							Q N	FED MFORS CODE ACCTG NR FROM NAV COMPT	3 1 5 9	NOTE ④ 6 6 Ø Ø						2 R					P N Z	C		Q	B	3 1 6 Ø
COMMERCIAL OVERHAUL RETURN TO RFI	17	B A 2	N 3 2							N	Ø Ø 3 8 3	Ø Ø Ø 5	NOTE ④ 6 6 Ø Ø						2 R					P N Z	L		Q	Ⓒ	3 1 6 Ø
WITHDRAWAL FROM STOCK ON CUSTODY RECEIPT	18	B O C	N 3 2							N	Ø Ø 1 8 8								2 R					P N Z	C		Q	Ⓒ	3 1 4 Ø
RETURN TO STOCK FROM CUSTODY	19	B O L	N 3 2							N	Ø Ø 1 8 8								2 R					P Q Z	L		Q	Ⓒ	3 1 7 Ø
ISSUE TO FOREIGN GOV'T	20	B 4 1	N 3 2							P	NOTE ④								2 R					P Q Z	H		Q	Ⓒ	3 1 4 5
RETURN OF MATERIAL FROM FOREIGN GOV'T	21	B M C	N 3 2							P	NOTE ④								2 R					P Q Z	L		Q	Ⓒ	3 1 7 Ø
ISSUE TO ANOTHER DOD AGENCY	22	B 1 A B 3 A B 4 A	N 3 2							NOTE ⑤									2 R					P Q Z	H		Q	Ⓒ	3 1 5 3
RECEIPT OF MATERIAL FROM ANOTHER DOD AGENCY	23	B L B B J 9	N 3 2							N									2 R					P Q Z	L J		Q	Ⓒ	3 1 7 Ø
SURVEY BASED ON ASO DIRECTIVE OTHER SURVEY'S (EXCEPT O&R)	24	B G D B A 3	N 3 2							N	6 2 2 6 9								2 R					P 3 3 C			Q	Ⓒ	3 1 6 Ø
TRANSFERS BETWEEN CONDITIONS EXPENDITURE	25	B A B	N 3 2							N	Ø Ø 1 2 7								2 R					P Q Z	C		Q	Ⓒ	3 1 4 8
TRANSFERS BETWEEN CONDITIONS RECEIPT	26	B A B	N 3 2							N	Ø Ø 1 2 7								2 R					P Q Z	L		Q	Ⓒ	3 1 4 8
LOSS BY INVENTORY	27	B A 4	N 3 2							N	Ø Ø 1 5 8								2 R					P 3 2	C		Q	Ⓒ	3 1 3 9
GAIN BY INVENTORY	28	B A 4	N 3 2							N	Ø Ø 1 5 8								2 R					P 3 2	L		Q	Ⓒ	3 1 7 Ø
RECEIPT FROM CONTRACT	29	B J 7	N 3 2							N									2 R					P 1 2	J		Q	Ⓒ	3 1 4 6

NOTE 1: USE APPROPRIATE CONDITION CODE (B, E or O)
NOTE 2: USE LAST FOUR NUMERICS OF CONTRACT SERIAL NR.
NOTE 3: USE APPROPRIATE CONDITION CODE
NOTE 4: ENTER COUNTRY CODE FROM APPENDIX 20 OF NAVSTRIP
NOTE 5: ENTER SERVICE CODE FROM APPENDIX II OF NAVSTRIP
NOTE 6: CONDITION CODE MUST BE BLANK

67	68	69	70	71	72	73	74	75	76	77	78	79	80
R.I. FROM			TRANS. CODE	P.R./RES.	FRACTION CODE	CONDITION CODE				JULIAN DATE OF TRANSACTION			
Q	N	C			Q	6				3	1	4	1
N	N	C			Q	6				3	1	4	2
N	N	C			Q	6				3	1	4	2
1	2	L J			Q	6				3	1	4	7
Q	N	A			Q	6				3	1	4	∅
Q	N	L			Q	B				3	1	4	1
Q	N	C			Q	B				3	1	4	3
N	N	L			Q	B				3	1	4	9
N	N	C			Q	6				3	1	5	9
N	N	L			Q	N				3	1	5	9
N	N	C			Q	N				3	1	7	5
N	N	L			Q	6				3	1	7	5
N	N	C			Q	N				3	1	7	1
3	3	4			Q	6				3	1	4	9
3	3	A			Q	6				3	1	4	9
N	N	C			Q	B				3	1	6	∅
N	N	L			Q	6				3	1	6	∅
N	N	C			Q	6				3	1	4	∅
Q	N	L			Q	6				3	1	7	∅
Q	N	H			Q	6				3	1	4	5
Q	N	L			Q	6				3	1	7	∅
Q	N	H			Q	6				3	1	5	3
Q	N	L J			Q	6				3	1	7	∅
3	3	C			Q	6				3	1	6	∅
Q	N	C			Q	6				3	1	4	8
Q	N	L			Q	6				3	1	4	8
3	2	C			Q	6				3	1	3	9
3	2	L			Q	6				3	1	7	∅
1	2	J			Q	6				3	1	4	6
67	68	69	70	71	72	73	74	75	76	77	78	79	80

IP

dicative of some of the many transactions applicable to high value items.

The prototype system was to incorporate as much as possible of what would be desired in a final system if implementation proved feasible. This meant that the system must give results which would meet the requirements of existing and/or proposed inventory management systems. For instance, all computer outputs from the control system applicable to the Aviation Supply Office Single Requirements Determination System must be in the proper format. It also meant that new assets would be available for use in requirements computation and that management must adjust procedures to accept these new assets. By-products of the system would provide such things as production data by individual item at individual Overhaul and Repair facilities, monitoring of reaction time to shipment directives, measurement of in-transit time between activities, exchange time between issuance of an item to a user and receipt of a like or interchangeable unserviceable item from that user, etc. System monitoring was programed on an exception basis. Standards were set for completion of given transactions. If these standards were met there would be no management action required. However, if the standards were not met the computer would "ring bells and blow whistles" and print out the details of the transaction for review and action by a member of a proposed asset control group. In some cases it was planned to have the computer print out an exception report which would go to all concerned as well as to the next senior activity.

Looking at Table #3 it is easy to follow the type of transactions involved in the accounting control system. For example, look at sample transaction number 5, Issue to squadron, exchange item required. BØA in columns 1-3 indicates to the computer that NAS Quonset Point (columns

67-69) has issued an exchange item to a squadron (columns 31-35) on Julian date 313Ø (columns 77-80). An offsetting transaction (see transaction number 6) must be received and matched within 5 days or an exception will be printed out. The exception of course, gives all known details of the transaction. It is interesting to note than in this specific case the advertised standard for issue and return of an exchangeable item is 3 days; however, the computer is programmed to allow 5 days in order to accomodate possible delays in processing and/or transmission and thus make the exception system less "nervous". This computer record is known as the HI-VAC Potential Recovery Record and may be called for by item, by activity when desired, by commodity managers.[44] Assets in this record are classed as In Store assets and are used in requirements computation.[45]

The In Store account mentioned above is the primary inventory account. This account contains all material held in store for issue to users, awaiting repair, etc. In addition, this account contains the HI-VAC Potential Recovery Record mentioned above and the HI-VAC In-Transit Record. The In-Place account contains the HI-VAC Commercial Overhaul Record, test bench installations, Government Furnished Material, etc. The Special Account is primarily historical and provides the HI-VAC Asset History Record. Such things as sales/transfers to other Governments or Agencies, losses, condemnations, cumulative procurements, etc. are

[44]Department of the Navy, Aviation Supply Office, HI-VAC Prototype Report, (Philadelphia: August 1963). p.6.

[45]Department of the Navy, Office of Naval Material, Aviation Material Management Improvement Program Quarterly Progress Report for the Quarter Ending 30 September 1963. pp. 1-5.

contained in this account. All records are maintained by item, by activity and each item/activity record must always balance.

Programing of the 1401/1405 computer system was completed about 1 May, 1963. Debugging of the program was accomplished to a limited degree by use of dummy data. Activities selected for the prototype run were NAS Quonset Point, NAS Brunswick, NAS Johnsville, NAS Willow Grove, NAS Norfolk, USS Intrepid, and USS RANDOLPH.[46] The degree of interactinn between these activities as well as the type of operation was a prime concern in their selection. The prototype, originally scheduled for 30 days, later extended to 60 days, beginning 17 May, 1963 had to provide sufficient information to establish the validity of audit trails in and among these activities. All activities were visited several times by the High Value Study Group. Some internal procedures at NAS Quonset Point and NAS Norfolk required standardization for the prototype.[47] These changes related primarily to the Overhaul and Repair cycle. The study group had found in the course of system development that no two Overhaul and Repair activities progress material undergoing repair in the same manner. For the period of the prototype Quonset Point and Norfolk agreed to standardize their systems. Clarification of NAVSTRIP data accounted for the majority of the groups time with prototype activities. Error rates were very high in the transaction reports being received in ASO at that time. HI-PRI items ("Q" fraction) were the inventory segment concerned in the prototype. This meant that the stock

[46]Department of the Navy, Aviation Supply Office, High Value Asset Control Prototype, (17 May - 14 June 1963). p.1.

[47]ASO, High Value Asset Control Prototype, op. cit. p. 2.

status reporting activities (NAS Quonset Point, Brunswick and Norfolk, and NSC Norfolk) would not have to change normal reporting procedures to any degree. No changes of any kind were required of NSC Norfolk. Transaction reports from these activities were duplicated at ASO as they came off the transceiver, one set went to regular processing, the second set was assimilated with reports from Johnsville, Willow Grove, Intrepid and Randolph and processed through the 1401/1405 High Value Asset Control program.[48]

The prototype ran from 17 May until 12 July 1963. Sixty four per cent of the transactions received during this period cleared a machine validation run and were accepted and processed through the 1401/1405 HIVAC program. Analysis of those transactions not accepted showed that they were rejected due to procedural problems such as (a) obligations against a "Z" (material requiring repair/rework, not ready for issue) condition stock record when the computer was programmed to accept obligations against RFI (material ready for issue) stock records only, (b) inadequate project codes and routing identifiers in NAVSTRIP, (c) duplicate document numbers in Overhaul and Repair transactions, (d) field errors, (e) errors attributed to interface problems with other than prototype activities, and "acceptable" errors (those transactions printed out for review before processing due to constraints in the computer program). All errors except those attributed to interface problems with non-prototype activities were corrected and successfully reintroduced into the computer program.

[48] ASO, High Value Asset Control Prototype. op. cit. pp. 5-7.

The assumption that material could be accounted for with a closed transaction reporting system monitored by a high speed random access computer was proved valid. The system balanced item accounts by activity and system, and provided audit trails for all transactions.[49] The High Value Study Group reported in part ---

> This system will meet the requirements of the AMMIP Program and will make possible a more definitive reply to GAO and other investigating teams. It also generally follows the Uniform Inventory Control Point system, as well as the recently published SECNAVINST P4440.29. In addition, it will make available to the commodity manager a more complete knowledge of the location of all assets, and thus may reduce - - or cancel - - procurements. The HIVAC system as designed is workable in most cases.

With the success of the protype ASO established a HIVAC Implementation Group[50]. This group was directed to coordinate its efforts with those of the Bureau of Supplies and Accounts and the other Navy Inventory Control Points and to attempt to make the HIVAC system compatible with the BuS&A HICAR system, a high cost asset reporting system under development at that time. Their aim was to insure that ASO would not lose the intelligence gained through HIVAC when the Uniform Inventory Control Point procedures were made effective. The group was also directed to discuss with the Bureau of Naval Weapons the cancellation of the SIR program.[51] It is presumed that both SIR and HI-PRI will be cancelled with the inception of HIVAC.

[49] ASO, High Value Asset Control Prototype, op. cit. pp. 5-7

[50] Department of the Navy, Aviation Supply Office, HI-VAC Implementation Group; establishment of, (Philadelphia; 4 November 1963) p. 1.

[51] ASO, HI-VAC Implementation Group, op. cit. pp.4-5.

V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

In order to reduce the tremendous expenditures for aeronautical spare parts brought about by the ever-increasing cost and complexity of modern weapon systems all of the Military Services are using varying degrees of selective management (management by exception principles) in their respective logistics systems. This concept of management provides for intensified management and control of the small number of high-value spare parts that account for the majority of the dollars invested in inventory. Concomittantly, the concept provides for deemphasis of controls and management effort applied to the large number of spares which are low cost and account for a relatively less significant inventory investment. The heart of all the management programs for high-value items has been the premise that increased control and management of these items will result in significant dollar savings as well as increased support.

Reviews of the various inventory management systems by outside agencies such as the General Accounting Office have revealed deficiencies. For the most part the deficiencies are attributed to inadequacies in the accounting control procedures for high-value items. The General Accounting Office contends that due to these deficiencies in asset control the degree of asset knowledge required for satisfactory management of high-value material is much less than adequate, and that as a result many thousands (in some case millions) of dollars have been wasted.

The Army Super High Dollar Value program is relatively small in

comparison with similar programs in the Air Force and the Navy. However, with Army aviation expanding rapidly the Army will be soon be faced with asset control problems such as those in the Air Force and Navy. The Army does, however, have the time to develop an adequate control system which can grow with their aviation program.

The degree of success of the Navy HI-PRI plan and the Navy SIR system has been less than optimum. Both programs have problem areas which prevent the realization of maximum possible savings through increased management and control. Some of the more important problems are:

(a) Frequent additions and deletions of items.

(b) Questionable initial item selection criteria.

(c) Item identification.

(d) Lack of audit trails within control systems.

(e) Inadequate system planning and testing prior to system implementation.

The ASO HIVAC program has been specifically designed to control high-value assets. The system appears to have been designed and developed in line with recognized "system design and development" techniques, ie. (a) formulation and understanding of objectives, (b) detailed policies, procedures, specifications, etc., and (c) testing and debugging prior to implementation.

NAVSTRIP and large scale random access data processing equipment have significantly enhanced the ability of ASO to design procedures and techniques for providing the precise control over high-value spares required for their effective management. The prototype of the HIVAC system using actual data generated by selected activities has proved

that the basic system as designed will provide control of high-value assets as planned.

CONCLUSIONS

The concept of selective item management has provided significant savings through the reduction of procurements of high-value items and through reduced management effort of low value items. While the extent of dollar savings could be argued, inasmuch as exact savings and costs cannot be determined, the continual decrease in capital investment in an aeronautical spare parts inventory in relation to the continual increase in capital investment in Navy active aircraft, is enough to indicate that extremely significant savings are being made.

While the preciseness of control sought under the various high-value inventory management programs has never been attained, because of unresolved problem areas, nevertheless, the increased attention focused on high-value material has brought about a greater accuracy of control than existed previously. In addition, the HI-PRI plan and the SIR system have provided a wealth of experience upon which the Navy was able to draw i designing the HIVAC system.

Criticism by the General Accounting Office in regard to inadequate accounting control of high-value material was, to a degree, justified. The quality of asset control required for satisfactory inventory management of high-value assets does not exist in the Navy (or the Air Force).

Inaccurate and untimely asset reports have been the major stumbling block to the Navy (and Air Force) in obtaining precise control over high-value assets. In designing the HIVAC system the Navy has made a concentrated effort to solve this major problem. When HIVAC is implemented it should greatly reduce, or, (hopefully) eliminate, the asset control

problem. When this is achieved, additional savings of magnitude, as well as increased support, should be realized.

There is obviously a need for better criteria for the selection of items to be included in high-value management systems, in order to prevent the frequent additions and deletions that now plague the systems. The established policy of the Navy Department only partially recognizes this problem in that it specifically provides only for stability of items with a unit price of $1000 and over. The policy is that such items will always be classed as high-value and be subject to control such as that provided in HIVAC. This will enable ASO to have stable coverage of over 6,000 items accounting for 64% ($813M) of their repairables inventory investment. A much less significant number of items will be covered at other Navy Inventory Control Points. The basic criteria for inclusion in or removal from high-value management in the Navy is predicated on forecasts or predictions of requirements. Such a policy builds in item migration. The state of the art of inventory management is not so high as to prevent constant movement into and out of high-value management when these latter criteria are used.

The basic requirement for successful asset control, the existence of a complete audit trail, is in the HIVAC system. This, and the use of a closed control system monitored by a central computer, should provide accurate and current asset knowledge. Such knowledge will enhance the quality of inventory management at ASO.

The decision to test the HIVAC program by actually running a prototype reflects a high degree of acumen in system design and development as well as sound management practice. If the HIVAC system is successful, this decision will be a major reason for such success.

RECOMMENDATIONS

It is assumed that the highest officials in the logistics support areas of the Military Departments and the Department of Defense are fully aware of the problem of asset control. If the HIVAC system proves successful when fully implemented through out the aviation segment of the Navy, immediate action should be taken to make these individuals fully cognizant of the tremedous contribution such a system can make to the field of inventory management. Cross fertilization of excellent management inovations and ideas must be carried out with dispatch if their full benefits are to be obtained.

The Navy, as the Air Force has done, should permeate their organization with a high-value management philosophy. Specialized management should be applied to all levels and in all functions. Consideration should be given to establishing "specialized repair/rework" activites for selected high-value items. A few items have been handled on this basis in the past with notatable success (i.e. gas turbine air starters at MCAS Cherry Point).

An intensified effort should be made to develop a realistic selection criteria for items to be managed under high-value management programs. Stability of items in these programs should be a major goal of the effort. The cost of item migration into and out of these programs could well exceed the cost of continuing to manage the item under high-value procedures until the time of its disposal.

A formal policy should be established which would require suitable testing of any management information system prior to its implementation. The definition of "suitable" depends, of course, on the systems characteristics and magnitude of consequences. The art of designing major

management information systems is similar to that of designing aircraft, there can be many a slip between the block flow diagram or the drawing board and a system which will produce the information required or an aircraft which will meet prescribed performance characteristics. Both must pass suitable tests before acceptance.

BIBLOGRAPHY

1. Comptroller General of the United States, Report to the Congress of the United States on Review of Selected Activities of the Aviation Segment of the Navy Supply System, (Washington: 1961).

2. Comptroller General of the United States, Report to the Congress of the United States on Review of the Supply Management of High-Value Repairable Aviation Assemblies and Equipment Within the Department of the Navy, (Washington: 1962).

3. Department of Defense, Assistant Secretary of Defense for Installations and Logistics, Aviation Material Management Improvement Program, (Washington, D.C.: 17 August 1963).

4. Department of Defense, Defense Supply Agency, Report on the Management of Aeronautical Material Within the Department of Defense (Volume 5) (Washington: January 1964).

5. Department of the Air Force, Air Force Spares Study Group; Check Up On Your HI-VAC Operations. (Hq. Air Material Command Wright-Patterson AFB, Ohio: undated).

6. Department of the Air Force, Air Force Spares Study Group; Improving HI-VALU Operations at A F Bases, (Hq. Air Material Command Wright-Patterson AFB, Ohio: June 1957).

7. Department of the Army, Supply and Maintenance Command, Aviation Material Maintenance Improvement Program Progress Report Quarter Ending 30 September 1963.

8. Department of the Navy,Aviation Supply Office, High Value Asset Control Prototype, (17 May - 14 June 1963).

9. Department of the Navy, Aviation Supply Office, HIVAC Implementation Group; establishment of, (Philadelphia: 4 November 1963).

10. Department of the Navy, Aviation Supply Office Instruction 4408.1 HI-PRI Plan (Philadelphia: 11 July 1958).

11. Department of the Navy, Aviation Supply Office letter of 12 July 1960: Planning and Control Conference, 14-14 June 1960, summary of.

12. Department of the Navy, Aviation Supply Office, High-Value Material Management Policies and Procedures Study, Phase 1 Report (Philadelphia 4 September 1962).

13. Department of the Navy, Commanding Officer, Aviation Supply Office Memorandum of 13 August 1962: Precept for a Study of High-Value Material Management Policies and Procedures.

14. Department of the Navy, Aviation Supply Office, HIVAC Prototype Report (Philadelphia: August 1963).

15. Department of the Navy, Aviation Supply Office: Report of the Non-RFI Material Study Group, (December, 1962).

16. Department of the Navy, Aviation Supply Office, Test Program for Application of Transaction Reporting and Random Access Data Processing Equipment to the Management of High Value Material (23 March 1962).

17. Department of the Navy, Bureau of Naval Weapons Instruction 4440.1A; Selected Item Reporting (SIR). (Washington: circa April, 1960).

18. Department of the Navy, Bureau of Naval Weapons Instruction 4440.1; Selected Item Reporting (SIR). (Washington: 29 September 1961).

19. Department of the Navy, Office of Naval Material, Aviation Material Management Improvement Program Quarterly Progress Report for the Quarter Ending 30 September 1963.

20. Department of the Navy, Office of Naval Material Letter of 30 August 1962: High Value Item Management Review of the Aviation Supply Office.

21. Hamilton, Alexander. The Federalists.

22. Navy Stock List of the Aviation Supply Office, Section P2099, June, 1963.

23. Navy Stock List of the Aviation Supply Office, Section P2099, July, 1960.

24. Murphy, Charles J. V. The Drive to Reduce Defense Spending, Fortune, (January 1964).

25. Secretary of the Navy Instruction P4440.29, High Value Item Management Policy Manual (Washington; 18 June (1963).

26. United States General Accounting Office, Defense Accounting and Auditing Division, Report on Review of Supply Management of Electronic Supplies and Equipment Within the Department of Defense, (Washington: 1960).